



# **Sonicator**

## **ULTRASONIC PROCESSOR**

Part No. Q55

## **OPERATION MANUAL**



53 Church Hill Road, Newtown, CT 06470 U.S.A

Phone: 203.426.0101 • 1.877.338.9636

Fax: 203.426.7026

Web: [www.sonicator.com](http://www.sonicator.com) • E-mail: [info@sonicator.com](mailto:info@sonicator.com)



## **Table of Contents**

| <b><u>Section</u></b>                                | <b><u>Page No.</u></b> |
|--|------------------------|
| 1. Warranty  | 4                      |
| 2. Warnings  | 5                      |
| 3. Specifications                                    | 6-7                    |
| 4. Principles of Operation                           | 8                      |
| 5. Description of Components / Functions of Controls | 9-10                   |
| 6. Preparation for Use                               | 10-11                  |
| 7. Operating Instructions                            | 11-12                  |
| 8. Maintenance                                       | 13-15                  |
| 9. Troubleshooting                                   | 15                     |
| 10. Service / Return of Equipment                    | 15                     |
| 11. Service Safety Certification form                | 16                     |

## 1. WARRANTY

Your ultrasonic processor is warranted and backed by the manufacturer for a period of two years from the date of shipment against defects in material and workmanship under normal use as described in this instruction manual. During the warranty period, the manufacturer will, at its option, as the exclusive remedy, either repair or replace without charge for material and labor, the part(s) which prove to be defective, provided the unit is returned to us properly packed with all transportation charges prepaid.

Ultrasonic probes are guaranteed against defects for a period of one year from date of shipment. A defective probe will be replaced once without charge, if failure occurs within the warranty period. Wear resulting from cavitation erosion is a normal consequence of ultrasonic processing, and is not covered by this warranty.

The manufacturer neither assumes nor authorizes any person to assume for it any other obligations or liability in connection with the sale of its products. The manufacturer hereby disclaims any warranty of either merchantability or fitness for a particular purpose. No person or company is authorized to change, modify, or amend the terms of this warranty in any manner or fashion whatsoever. Under no circumstances shall the manufacturer be liable to the purchaser or any other person for any incidental or consequential damages or loss of goodwill, production, or profit resulting from any malfunction or failure of its product.

This warranty does not apply to equipment that has been subject to unauthorized repair, misuse, abuse, negligence or accident. Equipment which, shows evidence of having been used in violation of operating instructions, or which has had the serial number altered or removed, will be ineligible for service under this warranty.

All probes are manufactured to exacting specifications and are tuned to vibrate at a specific frequency. Using an out-of-tune probe will cause damage to the equipment and may result in warranty nullification. The manufacturer assumes no responsibility for probes fabricated by another party or for consequential damages resulting from their usage.

The aforementioned provisions do not extend the original warranty period of any product that has either been repaired or replaced by the manufacturer.

## 2. WARNINGS

**Please read the manual in its entirety. Necessary instruction and guidance are provided to help ensure the successful operation of this device.**

Your new ultrasonic liquid processor has been designed, built and tested to assure maximum operator safety. However, no design can completely protect against improper use that may lead to bodily injury and/or property damage. For total safety and equipment protection, read the instruction manual carefully before attempting to operate this equipment. Observe the following **WARNINGS**:

- High voltage is present in the generator (power supply), converter and high frequency cable. There are no user-serviceable parts inside any of these devices. Do NOT attempt to remove the generator cover or converter case.
- Do NOT touch any open cable connections on the unit while the power is turned ON.
- Do NOT operate generator with converter disconnected from high voltage cable. High voltage is present in the cable and may pose a shock hazard.
- Do NOT attempt to disconnect the converter high voltage cable while the unit is running.
- The generator must be properly grounded with a 3-prong plug. Test electrical outlet for proper grounding prior to plugging in unit.
- Install the Sonicator in an area free from excessive dust, dirt, explosive or corrosive fumes and protected from extremes in temperature and humidity. Do not place the Generator within a Fume Hood.
- Hearing protection is highly recommended. It is recommended that a sound abating enclosure or ear protection be used when operating the Ultrasonic Processor
- NEVER immerse the converter in liquids of any kind, or let condensed moisture or liquid drip into the converter.
- NEVER grasp an activated horn or touch the tip of a vibrating probe. It can cause severe burns and tissue damage.
- NEVER allow a microtip to vibrate in air.
- NEVER hold or clamp the converter by the front driver or by the horn itself. This can cause permanent damage to the system. Support the converter by only clamping around the converter housing (upper portion).
- Do NOT allow the tip of a vibrating horn or probe to touch the counter top or any other hard surface. It could damage the probe, overload the generator, or damage the surface.
- Avoid touching the bottom or sides of a sample vessel with an activated probe. It may crack or shatter the glass or melt the plastic.
- Turn OFF the power switch, unplug the generator and disconnect the power cord from the back of the generator before attempting to replace the fuses.
- Inspect high frequency cable for cracks in the protective outer jacket.
- Do not operate unit with a damaged cable. Doing so may cause serious injury.
- In case of AC power loss, wait 3 minutes minimum before reapplying power.
- Do not turn off Main power switch while running a probe. Stop sonication by lowering intensity setting knob to 0 or release thumb switch.

### Symbols



Caution, Risk of electric shock, Hazardous voltage.



Caution, Risk of danger. Refer to User Manual.

### 3. SPECIFICATIONS

|   |                                   |
|---|-----------------------------------|
| <b><u>AC Adapter</u></b><br><b>(supplied with System)</b> |                                   |
| Input Voltage   | 100 VAC - 240 VAC @ 50/60 Hz 1.5A |
| Output Voltage  | 24 VDC 2.5A                       |
| Rated Power   | 60 Watts                          |

|                         |  |
|-------------------------|--|
| <b><u>Generator</u></b> |  |
| Input Voltage           | 24 VDC                                       |
| Rated Power             | 55 Watts                                     |
| Weight                  | 3 lbs. (1.36 Kg)                             |
| Dimensions              | 8"W x 7.5"L x 5.75"H<br>20cm x 19cm x 14.6cm |
| Output Voltage          | 700 Vrms (max.)                              |
| Output Frequency        | 20 KHz                                       |

|                         |                                   |
|-------------------------|-----------------------------------|
| <b><u>Converter</u></b> |                                   |
| Weight                  | 0.75 lbs. (0.34Kg)                |
| Dimensions              | 6" L x 1.25" Dia.<br>(15cm x 3cm) |
| Materials               | Aluminum Alloy                    |

|                                      |  |
|--------------------------------------|--|
| <b><u>Standard 1/8" Microtip</u></b> |  |
| Weight                               | 0.25 lbs. (0.11Kg)                     |
| Dimensions                           | 5.4" L x 0.5" Dia.<br>(13.8cm x 1.3cm) |
| Materials                            | Titanium Alloy                         |

| <b>Environmental</b>                       |  |
|--|--|
| Pollution Degree                           | 2  |
| Installation Category                      | II   |
| Operating Limits                           | Temperature: 41 - 104°F (5 - 40°C)<br>Relative Humidity 10 - 95% (Non Condensing)<br>Altitude: 6,651 ft. (2000 m)  |
| Shipping/Storage                           | Temperature: 35 -120 °F (2 - 49 °C)<br>Relative Humidity 10 - 95% (Non Condensing)<br>Ambient Pressure Extremes: 40,000 ft. (12,192 m)                       |
| Restriction of Hazardous Substances (ROHS) | <div style="background-color: green; color: white; padding: 5px; text-align: center;"> <b>RoHS Compliant</b><br/> <small>Directive 2002/95/EC</small> </div> |
| Relative humidity                          | Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity to 40°C   |
| Other                                      | For indoor use only  |

**The AC Adapter supplied with the ultrasonic processor must be used.** If the 220VAC plug is not configured to match the wall receptacle, a properly grounded universal AC socket adapter must be added.

Important: Universal adapters do not convert voltage or frequency. Manufacturer is not responsible for damage caused by the use of an improper power cord or adapter. Transformers are not recommended.



#### WEEE Statement

This product contains electrical or electronic materials. The presence of these materials may, if not disposed of properly, have potential adverse effects on the environment and human health. Presence of this label on the product means it should not be disposed of as unsorted waste and must be collected separately. As a consumer, you are responsible for ensuring that this product is disposed of properly. To find out how to properly dispose of this product contact Customer Service.

## 4. PRINCIPLES OF OPERATION

The ultrasonic electronic generator transforms AC line power to a 20 KHz signal that drives a piezoelectric converter/transducer. This electrical signal is converted by the transducer to a mechanical vibration due to the characteristics of the internal piezoelectric crystals.

The vibration is amplified and transmitted down the length of the microtip probe where the tip longitudinally expands and contracts. The distance the tip travels is dependent on the amplitude/intensity setting selected by turning the output control knob. As you increase the amplitude setting the sonication intensity will increase within your sample.

In liquid, the rapid vibration of the tip causes cavitation, the formation and violent collapse of microscopic bubbles. The collapse of thousands of cavitation bubbles releases tremendous energy in the cavitation field. The erosion and shock effect of the collapse of the cavitation bubble is the primary mechanism of fluid processing.

The probe tip diameter dictates the amount of sample that can be effectively processed. Smaller tip diameters deliver high intensity sonication but the energy is focused within a small, concentrated area. Probes with larger tip diameters can process larger volumes, but offer lower intensity.

The choices of a generator and horns/probes are matched to the volume, viscosity and other parameters of the particular application. The Accessories section has more information on this subject.

*Please consult with a product specialist for assistance with selecting a probe for your application.*



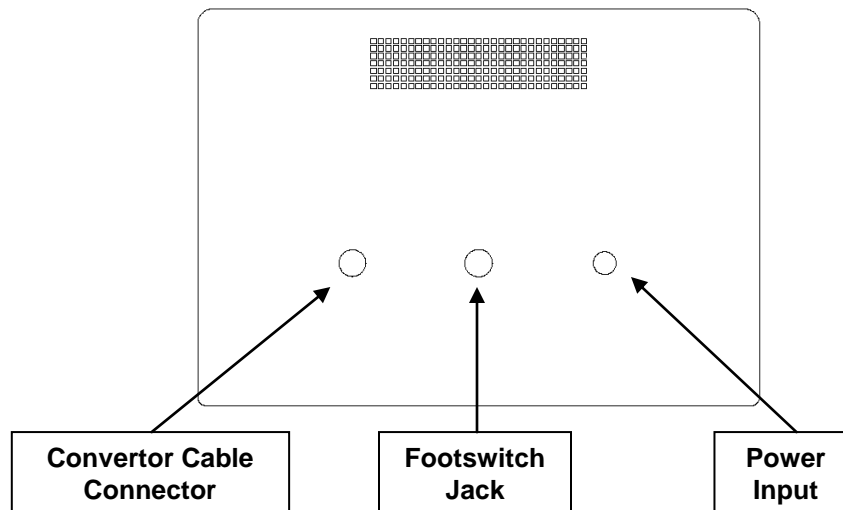
## **5. Description of Components / Functions of Controls**

The Model # Q55 includes a standard 1/8" diameter microtip (#4422).

### **Q55 Front Panel**



### **Q55 Rear Panel**



## FUNCTIONS OF KEYS, CONTROLS AND CONNECTORS

| FRONT PANEL             |   |
|-------------------------|---|
| Power Switch            | ON Position – energizes the power supply.<br>OFF Position – de-energizes the power supply.<br>Illuminates when the power supply is energized  |
| Amplitude Control Knob  | Controls the amplitude/intensity of vibrations at the probe tip   |
| Continuous/Thumb Switch | Continuous Position – Probe tip is energized when the amplitude is set above 0.<br>ThumbSwitch Position – Probe tip is energized once the thumbswitch or footswitch is depressed. The probe tip will stop when either switch is released. |

| REAR PANEL                         |  |
|------------------------------------|--|
| Footswitch Jack/Connector          | Connects to the footswitch cable.                  |
| Converter Cable Connector (Output) | Connects the power supply output to the converter. |
| AC Adapter Connector (Power Input) | Connects the power supply to the AC adapter.       |

### **6. Preparation for Use**

#### **INSPECTION**

Prior to installing the Ultrasonic Processor, perform a visual inspection to detect any evidence of damage, which might have occurred during shipment. Before disposing of any packaging material, check it carefully for small items.

The Ultrasonic Processor was carefully packed and thoroughly inspected before leaving our factory. The carrier, upon acceptance of the shipment, assumed responsibility for its safe delivery. Claims for loss or damage sustained in transit must be submitted to the carrier.

If damage has occurred, contact your carrier within 48 hours of the delivery date. **DO NOT OPERATE DAMAGED EQUIPMENT.** Retain all packing materials for future shipment.

#### **ELECTRICAL REQUIREMENTS**

The Ultrasonic Processor requires 24 volts DC. A universal 100V~240V, 50/60 Hz AC to DC switch-mode power supply capable of delivering 24 volts at 2.5 amperes is supplied with your system.

If it is necessary to convert the unit for different voltage operation, proceed as follows:

1. Ensure that the power cord is not connected to the electrical outlet.
2. Change the electrical power cord or add a properly grounded universal AC socket adapter as required.



### **WARNING**

For your personal safety, do not, under any circumstances, defeat the grounding feature of the power cord by removing the grounding prong.

## **INSTALLING THE ULTRASONIC PROCESSOR**

The Ultrasonic Processor should be installed in an area that is free from excessive dust, dirt, explosive and corrosive fumes, and extremes of temperature and humidity. If processing flammable liquids, use an approved fume hood and do not place the power supply in the fume hood.

When positioning the unit, be sure to leave adequate space behind the unit so that all connections can be easily disconnected.

## **7. Operating Instructions**

### **CAUTION**

- Do not operate the power supply unless it is connected to the converter.
- Never allow liquid to spill into the converter.
- Do not allow a microtip to vibrate in air.
- Do not allow the vibrating microtip to contact anything but the sample.
- Never place a washer between the probe and the converter.
- Never apply grease to the mating surfaces or threads of the converter or microtip.
- Should it become necessary to remove a probe, use the wrenches supplied. Never attempt to remove the probe by twisting the converter housing, as this may damage the electrical connections within the housing.

### **Set-up:**

1. Ensure that the amplitude control knob is set to 0.
2. Plug the electrical line cord into the electrical outlet.
3. If the optional foot switch is used, insert the plug into the jack located on the rear panel.
4. If the converter and probe assembly is not already assembled; screw the probe onto the converter and using the wrenches provided tighten it securely (see instruction in Maintenance section for attaching and detaching microtips).
5. If using a laboratory stand, mount the converter /probe assembly using a clamp. Be sure to secure the clamp to the upper section of the converter housing only. Do not secure the clamp to any other portion of the converter/probe assembly.
6. Connect the converter cable to the power supply.

## **Operation:**

### *Continuous mode:*

1. Ensure that the amplitude control knob is set to 0.
2. Set the convertor and probe assembly in a stand or hold the convertor in your hand.
3. Turn the unit on.
4. Immerse the microtip half way into the sample. If the probe is immersed to an insufficient depth, air will be injected into the sample, causing the sample to foam. Also ensure that the probe tip is not touching the wall of the sample vessel as it may be damaged and it will not vibrate properly.
5. Turn the amplitude setting dial to the intensity that you wish to run the unit at.
6. Sonicate sample for the desired amount of time and then turn the amplitude setting dial back to 0.

### *Remote (ThumbSwitch or Footswitch) mode:*

1. Ensure that the amplitude control knob is set to 0.
2. Set the switch on the front panel to ThumbSwitch.
3. If needed, connect the foot switch cable to the designated jack on the back of the power supply. Place the footswitch in a convenient location on the floor in front of the unit.
4. Hold the convertor in your hand or set the convertor and probe assembly in a stand.
5. Turn the unit on.
6. Turn the amplitude setting dial to the intensity that you wish to run the unit at.
7. Place the probe tip into the liquid sample being sonicated. Ensure that the probe tip is not touching the wall of the sample vessel and that it is properly submerged in the sample liquid to prevent aerosols/foaming.
8. Depress the thumbswitch or footswitch to start sonication of the sample.
9. Sonicate for the desired amount of time and then release the thumbswitch or footswitch to stop sonication.

## **8. Maintenance**

It is recommended to periodically inspect the unit, both visually and physically, to insure optimum and safe performance. This inspection should be scheduled as a routine maintenance procedure, done with the unit power **OFF** and with the unit unplugged from the AC power source.

Long exposure to acids or caustics results in corrosion of metal parts or components. Check the generator, converter, and cables periodically for any signs of rust or discoloration. If discoloration is found, move the unit away from the source of the contaminant.

Examine the condition of the high voltage cable that attaches the converter to the generator. Inspect the wire insulation for damage, such as wear, burning from hot plate contact or breakage from extended use or rough handling. In general use, the cable assembly should not be used to carry the converter or pull it toward the user. Make certain the cable always has slack and is never tensioned. If necessary, move the generator or converter assembly closer to one another to accomplish this. **WARNING: Do not use a cable with broken end connections, exposed wires or frayed insulation. High voltage is present in the cable and will pose a shock hazard. Do not touch the converter assembly until the power switch is off and the unit is unplugged.**

### **Microtip/ Probe Maintenance**

Ultrasonic processors create high intensity vibration which puts stress on the converter and horn assembly. The sides and end of the probe must **never** be allowed to come in contact with anything but the solution. When using a Microtip, the stress resulting at the point of contact with the vessel could cause the Microtip to fracture.

Proper care of the probe is essential for dependable operation. The intense cavitation will, after usage for period of time, cause the tip to erode, and the power output to decrease. The smoother and shinier the tip, the more power will be transmitted into the sample. The vibrations may also cause the probe tip to loosen over time or the threaded connection to accumulate debris. **Note:** *A loose probe will usually generate a loud piercing or squealing sound.*

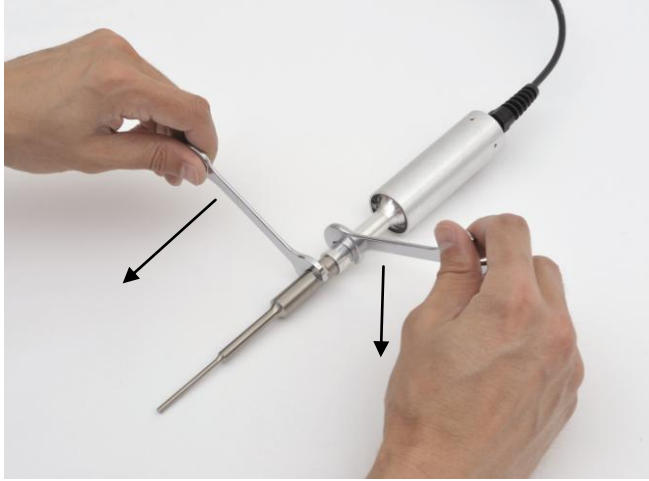
For that reason, **it is recommended that a preventative maintenance schedule be adopted to examine the unit at regular intervals.** The schedule should depend on frequency of use. Weekly maintenance schedules are recommended for units used frequently or monthly for those used infrequently. The tip must be examined for excessive wear and to ensure that the threaded connection is clean and attached properly to the convertor. Use a cotton swab and alcohol (i.e. ethanol, isopropyl, etc.) to clean the threaded mating surfaces.

***When excessive wear (corrosion/pitting of the probe tip) is detected the probe should be replaced with a new one.***

**WARNING: Never hand tighten probes or horns onto the convertor; properly tighten them with the appropriate Wrench Set.**

**Follow the steps below for attaching and detaching microtip probes:**

1. *Disconnect probe from convertor. Use the wrench set provided with the system.*



2. *Clean threaded stud. Use alcohol and a cotton swab to remove any debris on the threading of the connecting stud. Allow the alcohol to dry completely.*
3. *Clean threading in converter. Use alcohol and a cotton swab to remove any debris on the threading. Do not allow liquid to drip into Converter. Allow the alcohol to dry completely.*
4. *Reattach probe to converter. Screw the probe back onto the converter and tighten with the wrench set provided.*



### **System Cleaning Instructions**

The generator and converter may be cleaned using an acid-free cleaning solution (i.e. glass cleaner).

Probes should be cleaned using isopropyl alcohol. Probes are made from titanium and can be autoclaved (the converter is an electrical part and cannot be sterilized in this manner). Before each procedure place the probe tip in water or alcohol and turn the power on for a few seconds to remove residue. The tip also can be sterilized using alcohol with the power on.

## **10. Troubleshooting**

Your Ultrasonic Processor was designed to provide you with years of safe and dependable service. Nevertheless, because of component failure or improper usage, the possibility does exist that it might not perform as it should, shut down or stop working all together. The most probable causes for malfunction are listed below and should be investigated.

- A connector or cable is damaged.
- The microtip is not tightened properly with the wrenches provided.
- The converter and/or microtip has been dropped.
- A microtip being operated is damaged or worn past its useful life.

***If the problem persists after inspecting all of these, please contact Customer Service for additional assistance or to replace a worn microtip or damaged part.***

## **11. Return of Equipment**

It is suggested that an Ultrasonic Processor in need of repair be sent back to the factory.

In order to receive prompt service; always contact your Customer Service Representative before returning any instrument. Include date of purchase, model number and serial number.

**Please obtain a *Return Authorization Number* prior to returning the instrument.**

Care should be exercised to provide adequate packing to insure against possible damage in shipment. The Ultrasonic Processor should be sent to the "Service Department" with all transportation charges prepaid and return of shipment indicated.

### **Important**

The user must certify that the ultrasonic processor and/or the accessories returned for repair are free of any biohazardous or radioactive material and are safe for handling.

***Do not return any equipment unless such a certification can be made.***

## SAFETY CERTIFICATION FORM

Items being returned:

---

---

---

---

---

Please check only one item below:

☐ The equipment was never used or exposed to any radiological, biological or chemical agents and is safe to handle, use or dispose of.

☐ The equipment was used but not in conjunction with or exposed to any radiological, geological or chemical agents and is safe to handle, use, or dispose of.

☐ The equipment was used in conjunction with or exposed to radiological, biological, or chemical agents and has been decontaminated, rendering it safer for handling, use, or disposal.

### Authorization

By accepting authorization to return the equipment listed above, the undersigned assumes all responsibility and liability for radiological, biological and chemical decontamination. Delivery of the equipment can be refused if necessary documentation is not provided or where it is determined that the equipment has not been properly decontaminated. If it is determined that the equipment was not properly decontaminated, the Authorized Repair Facility reserves the right to bill the customer for any and all costs associated with the decontamination and/or appropriate disposal of the equipment. In the event the equipment has been exposed to radiological contamination, the signature of the Radioactive Safety Officer is required.

Print name: \_\_\_\_\_ RA # \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_